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New Species of Mexican Tailless Amphibia

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ABSTRACT: This paper describes five new species of Mexican anurans: *Hyla rickardsi*, Potrero Viejo, Veracruz (related to *H. loquax*); *Hyla arborescandens*, near Acultzingo, Veracruz (related to *Hyla miotympanum*); *Rana sierramadrensis* Agua del Obispo, between Rincón and Cajones, Guerrero (related to *R. palmipes* and *R. zeteki*); *Eleutherodactylus caetorum*, 20 miles northwest of Tehuacán, Puebla (related to *E. augusti*); *Eleutherodactylus natator*, Tlilapam, Veracruz (related to *E. guentheri* and *E. rugulosa*).

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FIVE species of tailless amphibians are described in this paper from the collections made in Mexico by Doctor Hobart Muir Smith and myself. They may be characterized as follows:

*Hyla rickardsi* sp. nov.

(Plate XLI, figs. 1-8)

*Type.* EHT-HMS, No. 5947, ♂; collected near Potrero Viejo, Veracruz, August 29, 1936, by Mr. and Mrs. Dyfrig McH. Forbes and E. H. Taylor.

*Paratypes.* EHT-HMS, Nos. 5897-5970; same locality, date, and collectors as type; Nos. 1431-1490, four miles east of Encero, Veracruz, July 17, 1932; E. H. Taylor and H. M. Smith, collectors.

*Diagnosis.* A medium-sized species most closely related to *Hyla loquax*, but differing in having a canthus rostralis, in having the posterior part of femur pigmented (reddish, lacking dark pigment in *H. loquax*), in having a white line along outer edge of foot and across anal region; the eye and tympanum are proportionally larger.

Vomerine teeth small, directly between choanae; diameter of tympanum about one half length of eye; head wide, the interorbital width much greater than width of an eyelid; a medial vocal sac;

fingers more than half webbed; toes with membranes reaching the base of the disks on the outer side; disk and distal phalanx of the fourth toe free, save for a marginal skin flap; when arm is placed at right angles to body an axillary, winglike web becomes evident, extending along side, reaching two thirds of the distance to elbow; disks on digits moderately large; heel reaches to a point between eye and nostril. Color variable, gray to vinaceous.

*Description of the holotype.* Head rather broad; eyes prominent, longer than snout (eye 4.2 mm., snout 4 mm.); nostril much nearer tip of snout than eye, the distance between nostrils equal to distance from eye to nostril; canthus rostralis rather angular, continued somewhat in advance of nostrils, the lines when projected intersecting at the tip of the snout; lores sloping but slightly, the region not concave; diameter of tympanum (2 mm.) one half diameter of eye; tympanum distinct, but covered with pigmented skin, separated from eye by a distance equal to two thirds diameter of tympanum; upper eyelid (3.2 mm.) much less than interorbital distance (4.5 mm.).

Vomerine teeth on two raised areas, which are much closer together than to choanae, and wholly between the choanae, which are distinctly larger than a single group of teeth; tongue cordiform, distinctly broader than long, emarginate behind, and free for about one seventh of its length; openings into the vocal sac very elongate (4.5 mm.).

Digital pads on fingers large, those on three outer fingers equal to or larger than tympanum; fingers one half to two thirds webbed; nowhere do the webs reach the disks save by a narrow margin of skin; distal subarticular tubercles large, all single; proximal tubercles on two outer fingers more or less obsolete; palm and webs strongly areolate; a large bean-shaped pad at base of first finger; a pair of small palmar tubercles; no fold or tubercles on under side of humerus; legs long, moderately slender, the tibiotarsal articulation reaches to nostril; toes with disks smaller than those on outer fingers, webbed for three fourths of their length, the web reaching the disk on outer side of first to third toes; a prominent inner and a low, rather indistinct, outer metatarsal tubercle; undersurface of toes, sole of foot and web strongly areolate; a distinct tarsal fold; a strongly defined supratympanic fold extending back to above arm or farther along side. When femur is extended a well-defined axillary web is seen extending about half the length of body, and reaching much more than halfway to the distal end of the humerus. A large vocal sac.

Skin above smooth (under a lens, minutely corrugated); skin on chin is greatly folded, but smooth; chest and abdomen, ventral surface of thigh, and region below anus strongly granular or areolate.

*Color.* Above vinaceous with numerous spots of a lighter shade and a few scattered black flecks; below yellowish or cream; concealed surfaces of limbs, and axillary web yellowish; pigment on sides of head slightly darker than on back; a white line borders the outer edge of foot and fifth toe; a transverse white line above anus; an indistinct light line borders the canthus and the supratympanic fold. Femur with scattered pigment on dorsal and posterior surfaces; the pigment extends about halfway on the anterior surface of femur; a few scattered, indistinct, whitish or cream spots along the sides; limbs more or less barred with brown; dark-brown stripe on underside of heel, encroaching on sole and underside of fifth toe; remainder of undersurface of foot, and hand without pigment; outer part of the chin with pigment; vocal sac lemon yellow.

*Measurements (in mm.).* Snout to vent, 37; snout, 4; head length, 11.2; head width, 13; eye length, 4.2; eyelid width, 3.2; interorbital width, 4.5; tympanum, 2; foreleg, 23.6; longest finger, 11; hind leg, 66.5; tibia, 21; foot, 27.5.

*Variation.* Color variation is great, many of the specimens being a light gray (yellowish gray at night) with the banding on the limbs obscure; others are lavender grayish, lavender, clay or light variegated brown. The color is not associated with sex. In all cases there are small black flecks scattered on the back; the white line on the foot is always present, and lighter lines usually follow the canthi and intersect on the snout.

*Remarks.* This species has been encountered only twice. Fortunately each time they were found breeding and large series were obtained. The specimens were taken from plants growing out of the water. Many were found clasping, but no eggs were seen. The calls of this species were mingled in a chorus of the voices of *Bufo marinus*, *Bufo valliceps*, *Hyla staufferi*, *Rana pipiens*, *Rana palmipes* and *Hylella picta*.

Specimens of this form have been compared with the type of *Hyla godmani* Günther by Mr. H. W. Parker,\* who points out several differences. This form, which Kellogg has placed in the synonymy of *H. miotympanum*, lacks an axillary web, and the males have a horny excrescence on the thumb which is likewise true of *H. miotympanum*. From Peters' *H. microtis*, which Kellogg places in the synonymy of *H. miotympanum*, it differs in having the

\* I wish to acknowledge my debt to Mr. H. W. Parker for this courtesy.

posterior and anterior surface of the femur without pigment and the line on side absent. Other differences likewise obtain.

The only other Mexican frog with which it might be confused is *Hyla loquax*, which likewise has an axillary web, but which differs in numerous characters, the most salient of which are mentioned in the diagnosis. *H. loquax* is known in Mexico only from Tres Brazos and Encarnación, Campeche, where Dr. Hobart Smith discovered it, September 17-19, 1936.

This species is dedicated to Mr. John A. Rickards, Tacubaya, Distrito Federal, who has manifested interest in my studies in Mexican herpetology, and who has presented me with numerous valuable specimens.

*Hyla arborescendens* sp. nov.

(Fig. 1)

*Type.* EHT-HMS, No. 3135, ♂; collected on mountainside about 3 km. southwest of Acultzingo, Veraacruz, July 22, 1932, by E. H. Taylor and H. M. Smith.

*Diagnosis.* A medium-sized, olive-colored hyla with strongly-defined canthi which continue onto tip of snout and intersect;

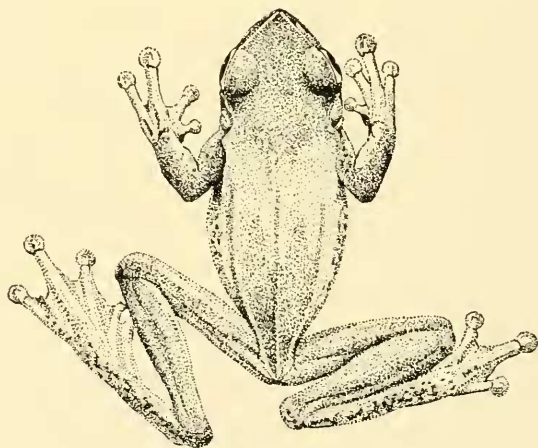


FIG. 1. *Hyla arborescendens* sp. nov. Type.  $\times 2$   
EHT-HMS, No. 3135, 3 km. southwest of Acultzingo,  
Veraacruz. Actual snout-to-vent length, 37 mm.

tibiotarsal articulation reaches slightly in advance of the eye; tympanum rather indistinct, its diameter about one third of the eye; interorbital space one third wider than eyelid; fingers about one fourth, toes a little more than two thirds webbed; subgular vocal sac; throat and chin pustular; abdomen and breast strongly areolate; dorsal surface with minute corrugations.

*Description of holotype.* Vomerine teeth in two raised clusters much closer to each other than to the choanae, situated between but extending a third of their length behind posterior edges of choanae; tongue broad, cordiform, nearly two thirds the width of the mouth, the surface with prominent papillae; head as broad as or a little broader than body; eyes prominent, extending beyond profile of jaw when seen from above; diameter of the eye (4.2 mm.) equal to snout, greater than distance of eye from nostril; distance between nostrils (3 mm.) less than interorbital distance (4 mm.), which is greater than the width of an eyelid (3.3 mm.); tympanum 1.3 mm. long, 1.4 mm. high, about one third diameter of eye, separated from eye by a distance (2.3 mm.) much greater than its diameter; snout (seen from above) terminating in a sharp point; a slight vertical ridge on tip of snout; loreal region subvertical, not or but slightly concave.

No trace of an axillary web; arm normal; digits with tips dilated into disks, all save those on inner finger larger than tympanum; second and fourth fingers of equal length; fingers one fifth to one fourth webbed, the webs continued as a narrow dermal fringe along the edges of fingers to disks; a large nuptial callosity, covered with minute horny spines, dark brown in color, reaches to near the disk of first finger; elongate pad on first finger nearly covered with the nuptial spinosities; two small palmar tubercles, one partly anterior to the other; outer subarticular tubercles large, flat, none divided; proximal tubercles small; supernumerary tubercles forming indefinite rows on metacarpals; a more or less continuous row of tubercles on under surface of forearm; upper surface of hand and arm with indistinct, but numerous, flat, pustular elevations. When legs are folded at right angles the heels overlap about four millimeters; disks on toes slightly smaller than those on fingers; those on three outer toes distinctly larger than tympanum; toes between two thirds and three fourths webbed, the outer webs excised to level of the median subarticular tubercle on the fourth toe; web nowhere reaches the disks save as a narrow dermal fringe; distal subarticular tubercles large, proximal ones small; supernumerary tubercles forming indistinct rows on metatarsals; a large, flattened inner metatarsal tubercle, a small indistinct outer; a tarsal fold moderately distinct; third finger only minutely longer than fifth. A moderately thick fold from behind eye above tympanum, curving down to the arm insertion; anal flap broad, somewhat thickened, with numerous grooves on its outer surface; throat pustular; breast

and abdominal surface strongly granular; sides indistinctly areolate; underside of femur with an area of large, areolate granulations intermingled with smaller granules, these reaching up on posterior part of femur to anus, where they form a transverse row of large pustules; a fold across chest.

*Color.* Above deep purplish lavender, gradually becoming less heavily pigmented on sides of head, body and limbs; ventral surfaces brownish-cream, with a faint scattering of pigment on abdomen and chin; ventral surfaces of heel and foot rather heavily pigmented except on inner toes; sides lightly pigmented, with a few very indefinite darker spots exposed; dorsal surface of foot with small, scattered, darker spots. (In life the color was indefinite olive, the ventral surface yellowish-cream.) Posterior side of femur lightly pigmented; a few indefinite lighter spots on dorsal surface of femur, and on sides of anus; no bands on arms or legs.

*Measurement (in mm.).* Snout to vent, 37; head length, 12; head width, 13; snout, 4; foreleg, 26; hand, 13; hind leg, 63; tibia, 19.5; foot, 27.

*Remarks.* The separation of this species from known Mexican species may be made by use of the character of the canthus rostralis combined with the large nuptual callosity and the lack of bands on hind limb. From *H. bistrincta*, which has a large nuptual callosity, it may be distinguished by the absence of the very peculiar ventral prolongation of the anal flap; the presence of a well-defined outer metatarsal tubercle, and a smaller, more posterior series of vomerine teeth; from *H. plicata* by the posterior position of the vomerine teeth and the presence of a web on fingers (absent in *H. plicata*); from *H. rickardsi*, by the absence of an axillary web; from *H. taeniopus*, by the fact that the pads on outer fingers and toes are much larger than the tympanum; tongue distinctly notched behind, and a transverse fold on chest; hind limbs not barred; from *H. miotympanum* by the more posterior position of the vomerine teeth; the presence of sharp canthi, the corrugated dorsal surface, the absence of the light external stripe from elbow and heel to digits. There is no stripe on upper lip or side. (*Hyla miotympanum* has been taken in type locality of the present species.)

The type was collected at night during a downpour of rain, in a low tree, near the large spring which issues from the side of the mountain near where the highway crosses. The call was a single, rather low, mournful call, lasting about one and one-half seconds and repeated at intervals from three to four minutes. The specimen

was located only with the greatest difficulty. It was heard on the night of July 21, at which time two hours were spent trying ineffectually to locate the specimen in a low bushy tree. The following day the tree was cut down, but the frog was not found. The following night the animal was again heard, and finally located in an adjoining tree, and captured. Specimens of what I believed to be this species were heard about September 1, 1936, in the forest trees on this same mountain side, but none was captured.

*Eleutherodactylus cactorum* sp. nov.

(Fig. 2)

*Type.* EHT-HMS, No. 6383, ♀; collected, km. 226, 20 miles northwest of Tehuacán, Puebla, August 30, 1936; E. H. Taylor, collector.

*Paratypes.* EHT-HMS, Nos. 6376 (topotype), H. Radelyffe Roberts, September, 1936; 6382 (topotype), E. H. Taylor.

(Fig. 2)

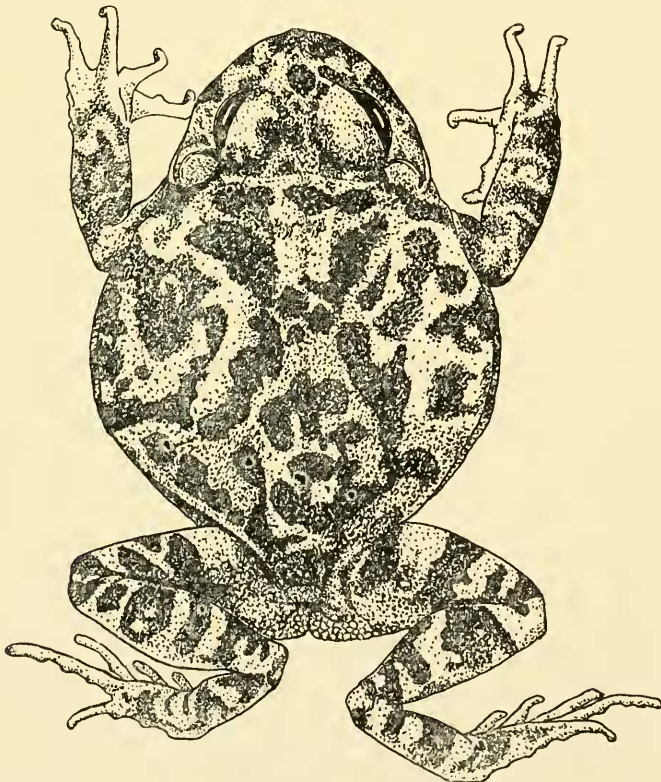


FIG. 2. *Eleutherodactylus cactorum* sp. nov. Type. EHT, No. 6383, ♀, 20 miles northwest of Tehuacán, Puebla. Snout to vent, 77 mm.

*Diagnosis.* A member of the group in the genus *Eleutherodactylus* having club-shaped digits with the terminal disk lacking; the dorsal and ventral surfaces of the terminal phalanx undifferentiated from skin on remainder of digit, and lacking a trace of a transverse terminal groove; a well-defined ventral disk on abdomen.

A strong fold from eye above tympanum, continuing back to groin and anus; a transverse postorbital fold; head much broader than long; eye a little longer than its distance from nostril; upper eyelid much wider than interorbital space; tibiotarsal articulation reaches tympanum; hind legs folded at right angles to the body, the heels are separated by 7.3 mm.; no trace of a tarsal fold; vomerine teeth between and behind choanae; first finger distinctly longer than second. Brownish-white with a pattern of dark lavender on dorsal surfaces; uniformly cream or yellowish on ventral surfaces.

*Description of the holotype.* Head much broader than long (31.5 mm.  $\times$  24.9 mm.); interorbital distance distinctly less than upper eyelid (5 mm. to 8 mm.); length of eye (9 mm.) a little greater than distance from nostrils, which are situated very near extremity of snout; distance between nostrils less than their distance from eye; tympanum, 5.8 mm. high, 5 mm. long, separated from eye by a distance equal to about one third its height; tympanum partly concealed by the supra- and posttympanic folds; no canthus rostralis, the lores slightly concave, sloping obliquely to lip edge; eyes not extending beyond outline of head seen from above; tongue broad, not or but slightly nicked behind; vomerine teeth in a transverse series on raised, more or less rounded areas, situated between and partially behind choanae, separated from each other by a distance less than half their distance from choanae. (Male with a median vocal sac.) Limbs rather short, the first toe longer and much thicker than second toe, nearly as long as the third toe; subarticular tubercles on hand prominent, rounded; a large tubercle at base of first finger and a large semidivided palmar tubercle; several supernumerary tubercles on anterior part of palm; no trace of a web on hand and no lateral fringes on fingers, save a slight fold on the inner side of digits two and three; terminal phalanx of digits thickened, not or only slightly dilated; hind limbs relatively short, thick, the heels separated when adpressed; digits relatively short, the terminal phalanx not wider than digit, but thickened somewhat; third toe a little longer than fifth, which is free for a length half the free part of fourth toe; no trace of web or dermal folds on digits; tip of toes thickened, but not widened; subarticular tubercles prominent; several supernumerary tubercles on the sole, and occasional low ones between subarticular



tubercles; inner metatarsal tubercle large, about four fifths the length of first toe; outer metatarsal tubercle somewhat smaller than inner; a faint trace of a medial metatarsal tubercle; a small supernumerary tubercle lies between the anterior edges of the metatarsal tubercles.

Skin above everywhere finely and evenly corrugated, without tubercles; a strong glandular fold begins at posterior corner of the eye, passes diagonally across upper posterior edge of tympanum and is continued as a narrow skin fold to anus; a small post tympanic fold to angle of jaw; sides and ventral surfaces perfectly smooth, save for heavy granulation of the median ventral and posterior part of femur, the granulation reaching up on both sides of the median posterior groove to the anus, where the granulations become pustular; ventral disk moderately distinct.

*Color in life.* Ground color gray to brownish-cream with an irregular pattern of large purplish to lavender blotches, less distinct on sides; arms and legs banded with dirty cream and lavender; fingers and palm of hand cream; ventral surfaces cream with slight pigmentation on outer edges of jaws; heel and sole dim lavender; toes generally cream; posterior part of femur lavender with some darker mottling.

*Remarks.* The three specimens of this species were collected in large mounds formed by a species of cactus. Often the mounds would have a circumference of thirty feet, a height of two or three feet, and would contain many hundreds of the thick plants. Usually the plants or stems grow so closely together that one can scarcely find an opening large enough to insert a pencil. Occasionally rodents burrow under or gnaw a passageway beneath the mound. In this way the amphibians apparently gain entrance. When first picked up the largest female specimen uttered a curious squeal or scream (suggestive of the noise made by a frightened rabbit), and voided urine in a continuous stream. The other female behaved in much the same fashion. More than a total of twenty of these large plants were destroyed, but only two yielded specimens of the new form. Numerous specimens of insects, snakes, lizards and other frogs were taken in this same habitat.

#### KEY TO THE LATICEPS GROUP OF ELEUTHERODACTYLUS

- A. Toes with vestige of a web; head wider than body; a sharp-edged tarsal fold.  
Yucatán ..... *laticeps* Duméril and Bibron,
- AA. Toes without vestige of a web; head not wider than body; no tarsal fold.  
B. Limbs short, thick; eyelid greater than interorbital distance; tibiotarsal articulation reaches anterior edge of tympanum; when leg is folded, the heels are widely separated. Puebla; 78 mm. .... *cactorum* sp. nov.,

BB. Limbs longer; tibiotarsal articulation reaches the middle of eye or slightly farther; when limbs are folded the heels touch or overlap slightly; eyelid less than interorbital space.

C. Tympanum  $\frac{2}{3}$  to  $\frac{1}{2}$  diameter of eye; dorsal surface smooth; Texas; 90 mm. .... *latrans* Cope,

CC. Tympanum scarcely more than one half diameter of eye; Guanajuato; 75 mm. .... *augusti* Dugès.

Measurements of *Eleutherodactylus cactorum* *E. latrans* and *E. augusti* (in mm.)

Species.....	<i>cactorum</i> .	<i>cactorum</i> .	<i>cactorum</i> .	<i>latrans</i> .	<i>augusti</i> .
Number.....	6382	6376	6383	17755*	6378
Sex.....	♂	♀	♀	♀	♀
Snout to vent.....	67	78	77	77	75
Snout.....	8.2	9	9.3	11.5	11.2
Eye length.....	7.7	8.3	9	7.5	8.8
Eye to nostril.....	7.4	7.3	8	9	8.1
Interorbital width.....	5.5	6	5	7.4	7
Upper eyelid.....	7	7.3	8	6.1	8
Tympanum height and width.....	5.8, 5.1	6.6, 5.3	5.8, 5	6.8, 5.8	5.4, 5
Head length.....	22	24.8	24.9	27.3	24.2
Head width.....	29	30.2	31.5	30	31
Arm.....	39	44	44	52.4	47.5
Finger 1.....	11	11	11	12	10.3
Finger 2.....	7	8	7.1	11	8.3
Finger 3.....	11.8	12	12.3	15	14
Finger 4.....	8.5	8	9	12.7	9.2
Leg.....	91	93.5	92	103	109
Tibia.....	30	31	31	33.5	32
Foot.....	40	40	42	47.2	46
Tarsus.....	18	18	17.2	19	21
Toe 1.....	4.6	4.8	5	6.8	5.8
Toe 2.....	7.2	7.2	8	9.4	9
Toe 3.....	11	10.5	10.8	12.5	12.9
Toe 4.....	15.6	15.7	15.3	19	18.2
Toe 5.....	6	7	6.2	8	8

\* Kansas University Museum, Birds and Mammals.

*Eleutherodactylus natator* sp. nov.

(Plate XXXIX, fig. 2; Pl. XL)

*Type*. EHT, No. 6373. ♀; Tlilapam, Veracruz, August 16, 1936; E. H. Taylor, collector.

*Paratypes*. EHT, Nos. 6371, 6372, 6374, 6375. Same data as type.

*Diagnosis*. A member of the *liohyla* group, having the toes partially webbed, with the tips of digits dilated into moderately large disks; both inner and outer metatarsal tubercles present, a tarsal fold running little more than half way to heel; eye about

equal to its distance from snout; canthus rostralis distinct; nostril a little (about  $\frac{1}{5}$ ) nearer median tip of snout than eye; interorbital distance less than an eyelid; first finger equal to or minutely longer than second; bluish or purplish black on posterior surface of femur, enclosing yellowish (or cream) spots and reticulations; tibiotarsal articulation reaches beyond tip of snout; vomerine teeth between inner edges, but completely behind choanae; a fold from eye to shoulder; a diagonal lateral fold beginning much behind tympanum runs half the length of body; a second lateral fold may also be present; heels overlap when adpressed. Large; maximum size known, 93 mm.

*Description of the holotype.* Head oval, with well-defined canthi, the lines of which, if projected, would intersect at tip of the snout; the canthal line is slightly interrupted at nostril, and the canthi are separated by a somewhat greater distance immediately in front of nostril than behind nostrils; lores shallowly concave, the sides sloping rather sharply above, then sloping more obliquely down to lip. Eyes large, projecting somewhat beyond outline of jaw (as seen from above); eye (10.2 mm.) very slightly longer than its distance to nostril; latter a half closer to tip of snout than to the eye; distance between nostrils equals interorbital distance; width of upper eyelid (8 mm.) greater than interorbital distance (7.2 mm.); tympanum height (6 mm.) greater than length (5.1 mm.), somewhat irregularly pearshaped, separated from eye by a distance of four millimeters.

Tongue large, cordiform, slightly emarginate behind; vomerine teeth in diagonal series, on a pair of triangular elevations, separated from each other posteriorly by a distance greater than that between choanae and the anterior part of the elevation; inner edges of choanae separated by a distance a fourth or fifth greater than distance between nostrils.

Foreleg moderately developed, with the fingers terminating in well-developed disks, much wider than the narrowest part of outer phalanx (2 mm. to 3.2 mm.); the merest vestige of a web between the first and second fingers, which continues as a narrow skinfold on the inner part of the second finger; between the second and third fingers even a smaller trace of a web, but a skinfold is evident on the inner edge of the third finger. A prominent tubercle at base of first finger; a large, single palmar tubercle, bifid anteriorly; metacarpal tubercles nearly obsolete (evident in young specimens); sub-articular tubercles large, rounded; hind legs rather heavy, heels strongly overlapping (8 mm.); toes with well-developed terminal

pads which are greater in width than toe behind them (3.8 mm; 2.4 mm.); outer metatarsal tubercle small, rounded, opposite middle of inner tubercle, which is rather elongate (5 mm.  $\times$  2 mm.), slightly less than half the length of first toe (9.5 mm.); web between toes extends to upper edge of subarticular tubercle on the first toe; to the middle of the tubercle on outer edge of second and third toes; to posterior edge of proximal tubercle on outer edge of fourth, which is considerably in advance of this tubercle on fifth toe; a narrow dermal fringe on edges of all toes to disks; on outer side of fifth toe the fringe extends from a point some distance behind the proximal tubercle; a strong tarsal fold slightly more than half length of tarsus. Tibiotarsal articulation brought forward reaches beyond snout.

Skin rather smooth above, with some slight rugosities on the rump; an indistinct fold from eye back to shoulder; a fold from behind tympanum continues back about half way (or a little more) on side; an indistinct, broken, dorsolateral fold arises from the heavy supratympanic fold and continues back less than half the length of body. Sides of body with scattered flattened tubercles, almost granular from axilla, to a point half way back on body; chin with very indistinct granules; a slight fold on breast, representing anterior edge of the abdominal disk which is more or less distinct.

*Color in life.* Above, metallic, bronzy-green with a brownish-yellow, narrow, median line from snout to vent; on sides decidedly reddish in certain areas; groin yellow; upper surface of limbs same as ground color of back, save slightly more brownish, with some dull red on feet; chin, lavender-whitish; sides of abdomen pinkish; abdomen and ventral (and to some extent the anterior) part of femur washed with salmon; under surface of feet purplish; side of head purplish with a dark line on snout along the lower edge of canthus and supratympanic fold, widening and partially covering the tympanum, which is brownish; lip lighter, with dark purplish spots; arm and foot indistinctly banded. A few deep black spots on shoulder and in groin; femur and tibia dimly barred; posterior part of femur black, enclosing yellowish reticulations and spots; ventral surface of chin, breast, femur, and tibia with brownish mottling or spots.

*Measurements (in mm.).* Nos. 6373 ♀, 6371 ♀, 6372 ♂, respectively: Snout to vent, 93, 71.5, 42; head length, 35, 31, 18.2; head width, 35, 30.2, 16; eye, 10.2, 9.4, 5.6; eyelid, 8, 6.3, 5; interorbital width, 7.2, 5.9, 4; snout, 13, 11.3, 6; tympanum, height, length, 6 x 5.1, 4.5 x 4, 4 x 4.9; foreleg, 42, 38.2, 23.8; longest finger, 15.8, 12.2,

8; hind leg, 145, 127, 79; tibia, 48.5, 43, 28.2; foot, 66, 50, 35.5; longest toe, 28, 22, 14.

*Variation.* The tympanum of the male is far larger in proportion than in the female, though proportionally higher in the female.

The coloration of No. 6371 is practically identical with the type, save that the belly was yellowish rather than salmon in life, and the region below the tympanum reddish; No. 3672 was metallic bronze above, somewhat variegated with dull reddish and greenish, with the belly whitish. No. 6374, dark olive above, blackish between the eyes and on an area behind head; tubercle near ear, orange; the limbs bronze, barred with black; black and yellow on posterior side of femur.

*Remarks.* Save for the fact that both Dr. E. R. Dunn and Dr. Remington Kellogg\* pronounced the type of *Hylodes Berkenbuschii* Peters† identical to *Liyla rugulosa* Cope‡, I would have some slight doubt as to the distinctness of this form from Peters' species, since they agree in numerous characters. The characters which seem to separate the species are the following: The nostril is not twice as far from eye as the tip of snout (about 8 mm. to eye; 6.2 mm. to tip of snout); the first finger is equal or a little longer than second (not a little shorter than second); belly nearly uniformly yellowish or salmon, lacking dark spots; in No. 6372, a specimen of comparable length (42, [43]), the hind leg is about one ninth longer.

From *E. rugulosus* (Cope) it differs in having a sharp canthus instead of no, or a very rounded, canthus; snout rather sharply, rather than bluntly rounded; a relatively longer and slenderer body and longer limbs, with the tibiotarsal articulation reaching farther; the heels barely touching, and the webbing on toes distinctly less extensive. I believe it is a very much larger species. The largest authentic *E. rugulosus* seen measures 58.5 mm. head-body length. Kellogg's (*loc. cit.*) specimen, USNM No. 16567 Orizaba, is certainly a specimen of the species here described, and probably also 71159. I suspect that the large specimen, Field Museum No. 1482 (65 mm.) from Achotal, Veraacruz, listed by Kellogg (*loc. cit.*), also belongs to this form.

*Rana sierramadrensis* sp. nov.

(Plate XXXIX, fig. 1)

*Type.* EHT-HMS, No. 3963B; collected near Agua del Obispo, between Rincón and Cajones, Guerrero, July 1, 1932, E. H. Taylor.

\* Kellogg, U. S. Nat. Mus. Bull., No. 160, 1932, p. 116.

† Peters, Monatsb. Akad. Wiss. Berlin, Dec., 1869, p. 879.

‡ Cope, Proc. Amer. Philos. Soc., XI, No. 82, p. 160.

*Paratypes.* EHT-HMS, Nos. 3963A, topotype; 6565, about 9 km. southwest of Mazatlán, Guerrero (km. 337), July 21, 1936; 6566, near Agua del Obispo (km. 350-351), July 24, 1936; 6567, 6568, Agua del Obispo, August 1, 1936.

*Diagnosis.* A member of the group of the genus that includes *Rana palmipes* and *Rana zeteki*, but differing from these in having a very long hind leg, the tibiotarsal articulation reaching much beyond the snout. The toes are practically fully webbed, bearing well-developed terminal disks on the toes; dorsolateral line continuous; canthus rostralis distinct; outer metatarsal tubercle wanting.

*Description of the holotype.* Head generally oval, almost triangular; snout projecting considerably beyond mouth; tongue large, nearly one half total width of head, deeply notched behind and forming two rounded projections behind; vomerine teeth in two raised diagonal series, each a little larger than a choana and lying between, but almost wholly behind, the posterior borders of the choanae; maxillary teeth small, weak.

Head a little longer than wide (34.2 mm.  $\times$  31 mm.), the snout (12 mm.) as long as eye; nostril equidistant from eye and median tip of snout, the slight skinfold behind nostril terminating in a rounded bead posteriorly; nostril situated chiefly below canthus, but its upper edge tending to interrupt the continuity of the line; canthi projected forward intersect some distance anterior to the tip of the snout; width of upper eyelid (7.7 mm.) greater than interorbital distance (6 mm.); tympanum (6 mm.) separated from eye by a distance of 5 mm.

A well-defined dorsolateral fold continuous to groin; a fold, arising on the dorsolateral fold, going diagonally behind tympanum to arm insertion, more or less distinct; a short glandular fold behind jaw angle; skin more or less smooth, with a few minute, pearl-like tubercles scattered on rump (more pronounced in young).

Forelimbs moderately large, the first finger distinctly longer than second but about same length as third; the terminal disk on fingers poorly developed, scarcely wider than the digits; three large pads on the palm, all elongate, separate; subarticular tubercles prominent, that on first finger longest; a single small tubercle on each metacarpal. Hind leg very long, the tibiotarsal articulation reaching some distance (10 mm.) beyond tip of snout; an indistinct fold from the inner metatarsal tubercle back to heel; no outer metatarsal tubercle, the inner moderate, oval, a little more than one third length of the first toe; webs continued to base of disks, on all toes,

but somewhat excised between them; terminal disks distinctly wider than digits; subarticular tubercles elongate, well developed; tibia with some traces of minute glandular folds; part of posterior surface of femur strongly granulate.

*Color.* Above brown, becoming grayish brown on the sides, save in head region; a few indistinct darker brown spots scattered on the dorsal surface; head with an indistinct dark line from tip of snout, through eye along outer edge of the dorsolateral glandular fold; from tip of snout diagonally across upper lip to arm, a golden cream line; a few dark markings on arm suggesting transverse bands; a dark spot under forearm, and a heavy, dark lavender band on posterior side of humerus; a series of darker blotches along the ventrolateral region, bordering the lateral gray region; femur and tibia strongly banded, with scattered spots on anterior face of both, the bands on tibia reaching half way across under surface; posterior surface of femur black, with yellowish reticulations or spots; foot with transverse bands; under surface of foot dark purplish.

*Measurements (in mm.).* Nos. 3963B, 3963A, 6565, respectively. Snout to vent, 91, 70, 44.5; head length, 34.2, 28.5, 17.6; head width, 31, 25.2, 14; snout, 12, 10, 7.5; eye, 11.8, 8.1, 6; interorbital width, 6, 5.5, 3; tympanum, 6, 4.2, 3.1; forelimb, 50, 38, 27; hind leg, 168, 132, 69; tibia, 55, 44.5, 25.5; foot, 72, 55, 31.

*Variation.* The younger specimens 6665-6668 are reddish bronze above; posterior part of the dorsolateral line whitish; a broad black band from tip of snout, involving whole tympanum, continues along the upper part of side to groin; lower on side, grayish to gray-white. The line on lip especially distinct, bordered below by brown to black-brown; on abdomen and throat, cream or dirty white. The eye of the type is slightly larger than in the second specimen 3963A. This latter specimen in life had a few small olive spots on the back which are evident in the picture (plate XXXIX, fig. 1).

*Remarks.* This large species replaces *Rana palmipes* in the higher parts of the Sierra Madre del Sur. It is amazingly alert and makes prodigious leaps when pursued.

I have had large series of *Rana palmipes* for comparison from Veracruz and Chiapas. This species differs in having shorter legs; the tibiotarsal articulation reaching slightly beyond eye; the heels barely touching (very strongly overlapping in *R. sierramadrensis*), the skin strongly pustulous on sides and posterior part of back; the pads on the toes smaller; marked dermal fringes along edges of middle fingers; and the dorsolateral fold not continuous to groin.

## PLATE XXXIX

FIG. 1. *Rana sierramadrensis* sp. nov. Paratype: EHT-HMS, No. 3963A, Agua del Obispo, between Rincón and Cajones, Guerrero, México. Snout to vent, 70 mm.

FIG. 2. *Elcutherodactylus natator* sp. nov. Paratype EHT-HMS, No. 6371 ♀, Tililapam, Veracruz, México. Snout to vent, 71.5 mm.



PLATE XXXIX



## PLATE XL

*Eleutheroactylus natator* sp. nov. Type. EHT-HMS, No. 6373 ♀, Tlilapam, Veraeruz, México. Snout to vent, 93 mm.

PLATE XL



## PLATE XLI

*Hyla rickardsi* sp. nov. (about natural size).

- FIG. 1. EHT-HMS, No. 1472. Paratype, near Encero, Veracruz.  
FIG. 2. EHT-HMS, No. 1474. Paratype, near Encero, Veracruz.  
FIG. 3. EHT-HMS, No. 5947. Type, Potrero Viejo, Veracruz.  
FIG. 4. EHT-HMS, No. 5942. Paratype, Viejo, Veracruz.  
FIG. 5. EHT-HMS, No. 1444. Paratype, near Encero, Veracruz.  
FIG. 6. EHT-HMS, No. 1489. Paratype, near Encero, Veracruz.  
FIG. 7. EHT-HMS, No. 5968. Paratype, Potrero Viejo, Veracruz.  
FIG. 8. EHT-HMS, No. 5946. Paratype, Potrero Viejo, Veracruz.

PLATE XLI



1



2



3



4



5



6



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